

**Claims:**

25. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera comprising the steps of:

selecting a pulsed ablation laser having a pulsed output beam of predetermined wavelength;

selecting a beam spot controller mechanism for reducing and focusing said selected ablative laser's output beam onto a predetermined spot size on the surface of the cornea;

selecting a scanning mechanism for scanning said ablative laser output beam;

coupling said ablative laser beam to a scanning device for scanning said ablative laser over a predetermined area of the corneal sclera; and

controlling said scanning mechanism to deliver said ablative laser beam in a predetermined pattern in said predetermined area onto the surface of the cornea to photoablate the sclera tissue outside the limbus, whereby a presbyopic patient's vision is corrected by expansion of the sclera.

26. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which the step of selecting a pulsed ablation laser includes selecting a pulsed ablative laser having a predetermined wavelength between 0.15 - 0.32 microns.

27. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which the step of selecting a pulsed ablation laser includes selecting a pulsed ablative laser having a wavelength between 2.6 and 3.2 microns.

28. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which the step of selecting a pulsed ablation laser includes selecting a solid state laser.

29. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in

accordance with claim 25 in which the step of selecting a pulsed ablation laser includes selecting a pulsed gas laser having a pulse duration shorter than 200 nanoseconds.

30. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which said the step of selecting a beam spot controller includes selecting a pulsed ablative laser having a focusing lens with focal length of between 10 and 100 cm selected to obtain a predetermined laser beam spot size having a diameter of between 0.1 and 0.8 mm on the corneal surface.

31. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which the step of selecting a beam spot controller includes selecting a beam spot controller having a focusing lens with cylinder focal length of between 10 and 100 cm to obtain a laser beam spot having a line size of about 0.1-0.8 mm x 3-5 mm on the corneal surface.

32. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which the step of selecting a scanning mechanism includes selecting a scanning mechanism having a pair of reflecting mirrors mounted to a galvanometer scanning mechanism for controlling said laser output beam into a predetermined pattern.

33. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by an ablating laser beam in accordance with claim 25 in which said ablative laser is delivered to the surface of the cornea by an optical fiber.

34. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which the step of selecting a scanning mechanism includes selecting a hand-held optical fiber coupled to the ablation laser for scanning said laser output beam into a

predetermined pattern.

35. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which the predetermined pattern is generated by the steps of:

selecting a metal mask having at least one slit therein; and  
positioning the selected mask over the cornea surface for  
scanning the ablation laser thereover for controlling the  
ablation slit pattern on the sclera tissue outside the  
limbus.

36. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which said predetermined pattern includes at least 3 radial lines around the area of the cornea outside the limbus.

37. A laser beam ophthalmological surgery method for treating presbyopic in a patient's eye by ablating the sclera in accordance with claim 25 in which said predetermined pattern includes a ring pattern around the area of the cornea outside the limbus.

#### **ABSTRACT**

Presbyopia is treated by a method which uses ablative lasers to ablate the sclera tissue and increase the accommodation of the ciliary body. Tissue bleeding is prevented by an ablative laser having a wavelength of between 0.15 and 3.2 micron. A scanning system is proposed to perform various patterns on the sclera area of the cornea to treat presbyopia and to prevent other eye disorder such as glaucoma. Laser parameters are determined for accurate sclera expansion.